



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/909,074 | 07/19/2001 | Joyce S.Oey Hewett | 2000.075200/TT4629 | 9763 |

23720 7590 03/12/2003

WILLIAMS, MORGAN & AMERSON, P.C.
10333 RICHMOND, SUITE 1100
HOUSTON, TX 77042

EXAMINER

NGUYEN, KHIEM D

| ART UNIT | PAPER NUMBER |
|----------|--------------|
| 2823 | |

DATE MAILED: 03/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | |
|------------------------------|-----------------|---------------|
| Office Action Summary | Application No. | Applicant(s) |
| | 09/909,074 | HEWETT ET AL. |
| | Examiner | Art Unit |
| | Khiem D Nguyen | 2823 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 06 January 2003.

2a) This action is FINAL. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1,2,4-13 and 15-41 is/are pending in the application.

4a) Of the above claim(s) 16-41 is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) 1,2,4-13 and 15 is/are rejected.

7) Claim(s) _____ is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on 19 July 2001 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) The proposed drawing correction filed on _____ is: a) approved b) disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.

12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some * c) None of:

- Certified copies of the priority documents have been received.
- Certified copies of the priority documents have been received in Application No. _____.
- Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) The translation of the foreign language provisional application has been received.

15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

| | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

New Grounds of Rejection

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-2 and 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wilson et al. (U.S.P.A.P 2002/0032499) in view of Chen (U.S. Patent 4,405,677).

Wilson teaches a method of controlling a conductive layer deposition process comprising (See page3, paragraph [0025] and FIGS. 1 and 4):

depositing a conductive layer such as copper above a first semiconductor wafer based upon a deposition recipe (page 1, paragraphs [004] and [0008] and page 7, paragraph [0061]);

measuring a thickness of the conductive (copper) layer deposited on the semiconductor wafer and determining whether the measured thickness of the conductive (copper) layer is within a predetermined tolerance 76 (page 5, paragraph [0042] and FIG. 4); and,

revising the deposition recipe according to at least one predetermined model if the measured thickness of the conductive (copper) layer is not within the predetermined tolerance 78 (page 5, paragraph [0042] and FIG. 4);

Wilson discloses using the newest parameter derived in step 80 (FIG. 4) in processing subsequent microelectronic workpieces (paragraph [0042]). Therefore, Wilson inherently teaches depositing a conductive layer above a second semiconductor wafer based upon the revised deposition recipe.

Wilson fails to explicitly disclose revising at least one parameter selected from the group consisting of a chemical concentration of an electroplating bath and an anode-cathode spacing of the deposition recipe if the measured thickness of the conductive layer is not within the predetermined tolerance as recited in present claim 1.

Chen discloses that the thickness of a conductive layer may be controlled by varying the electroplating bath conditions, such as, by a chemical concentration in the plating solution, pH value of the solution, the temperature of the electroplating bath, the deposition rate or the length of time of electroplating (col. 8, lines 5-17). In view of recognition that the chemical concentration affect the deposition rate and, therefore affect the thickness in a given deposition time. It would have been obvious to one of ordinary skill in the art of making semiconductor devices to combine the teaching of Wilson and Chen to achieve ~~or~~ revising the recipe in Wilson by changing the chemical concentration.

3. Claims 6-13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wilson et al. (U.S.P.A.P 2002/0032499) in view of Chen (U.S. Patent 4,405,677).

Wilson teaches a method of controlling a conductive layer deposition process comprising (page3, paragraph [0025] and FIGS. 1 and 4):

depositing a conductive layer such as copper above a first semiconductor wafer based upon a deposition recipe (page 1, paragraph [004] and [0008] and page 7, paragraph [0061]);

measuring a thickness of the conductive (copper) layer at a plurality of predetermined pattern of locations (page 7, paragraph [0061] and Table 1) and calculating a value representing the measured thickness comprises calculating an average (arithmetic mean) of the plurality of thickness measurements (page 9, paragraph [0088]) then determining whether the calculated value is within a predetermined tolerance 76 comprises calculating a measure of a degree of dispersion of the plurality of thickness measurements about the calculated value and comparing the measure of the degree of dispersion to a predetermined statistical distribution selected from the group consisting of the standard deviation (normal distribution) (page 9, paragraphs [0088] and [0091] and page 5, paragraph [0042] and FIG. 4); and,

revising the deposition recipe based upon at least the calculated value if the calculated value is not within the predetermined 78 (page 5, paragraph [0042] and FIG. 4);

Wilson discloses using the newest parameter derived in step 80 (FIG. 4) in processing subsequent microelectronic workpieces (paragraph [0042]). Therefore, Wilson inherently teaches depositing a conductive layer above a second semiconductor wafer based upon the revised deposition recipe.

Wilson fails to explicitly disclose revising at least one parameter selected from the group consisting of a chemical concentration of an electroplating bath and an anode-

cathode spacing of the deposition recipe if the measured thickness of the conductive layer is not within the predetermined tolerance as recited in present claim 1.

Chen discloses that the thickness of a conductive layer may be controlled by varying the electroplating bath conditions, such as, by a chemical concentration in the plating solution, pH value of the solution, the temperature of the electroplating bath, the deposition rate or the length of time of electroplating (col. 8, lines 5-17). In view of recognition that the chemical concentration affect the deposition rate and, therefore affect the thickness in a given deposition time. It would have been obvious to one of ordinary skill in the art of making semiconductor devices to combine the teaching of Wilson and Chen to achieve ~~or~~ revising the recipe in Wilson by changing the chemical concentration.

Response to Amendment

Response to Arguments

Applicant's arguments with respect to claims 1-2, 4-13 and 15 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khiem D Nguyen whose telephone number is (703) 306-0210. The examiner can normally be reached on Monday-Friday (8:00 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chaudhuri Olik can be reached on (703) 306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 746-9179 for regular communications and (703) 746-9179 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

K.N.
March 6, 2003


George Fourson
Primary Examiner
2823